

fighting and henceforward were called Bhuinhārs. Another local legend declares that at a great sacrifice offered by Jarāsandha, king of Magadha, a sufficient number of Brāhmins could not be obtained, and the Dīwān therefore palmed off some men of the lower castes as genuine Brāhmins. The Brāhmins thus manufactured, failing to gain admission into their supposed caste, had to set up a caste of their own, the name of which (Bābhan or Bāhman) is popularly supposed to mean a sham Brāhmin. This tradition, it need scarcely be said, is not recognized by the Bābhans themselves, and like the other legends, it has clearly been invented to explain the claim of the Bābhans to be Brāhmins.

In the estimation of the general Hindu public, they now constitute a separate caste, and their degradation probably dates back to the time when Buddhism was overthrown. It has been pointed out that Bābhan is merely the Pāli form of Brāhmin, and that the word is often found in Asoka's edicts. It has therefore been conjectured that those now known as Bābhans remain Buddhists after the Brāhmins around them had reverted to Hinduism, and so the Pāli name continued to be applied to them; while the synonym Bhuinhār or Bhumihāraka is explained as referring to their having seized the lands attached to the old Buddhist monasteries. This theory is borne out by the Brahmanical titles of Misr, Pāre and Tewāri which are used along with the Rājput titles of Singb, Rai and Thākur; and by the fact that in this Province, they are practically confined to the area covered by the ancient empire of Magadha, which long remained the centre of Buddhism.

Koiris.

The Koiris call for only a brief notice. They are skilful and industrious cultivators, who are the best tenants to be found in the district. They are a purely agricultural caste, who also work as market-gardeners and rear such crops as vegetables, chillies, potatoes and poppy; they are proud of their position as adroit cultivators, and are indefatigable field-workers.

Bhuiyās.

The Bhuiyās of Gayā are an offshoot of the large Dravidian tribe of Bhuiyās which still numbers nearly two-thirds of a million. They appear to have come originally from the Tributary States of Chotā Nāgpur and Orissa, where the organization of the tribe at the present day is more complete than elsewhere. In this district they fell under the domination of people stronger than themselves, and found their level as laudless labourers working

in the fields. Cut off geographically from the original nucleus of the tribe, and socially degraded on account of their unclean habits of food, they are now one of the lowest of all the castes, but treasure among themselves the old tribal name of Bhuiyā.

The physical characteristics and the traditions of the Bhuiyās vary considerably in different places, but they all affect great reverence for the memory of Rikhmun or Rikhiāsan, whom they regard, some as a patron deity, and others as a mythical ancestor, whose name distinguishes one of the divisions of the tribe. It seems probable that in the earliest stage of belief Rikhmun was the bear-totem of a sept of the tribe, and that later on he was transformed into an ancestral hero, and finally promoted to the rank of a tribal god. However this may be, his cult is peculiar to the Bhuiyās, and serves to link together the scattered branches of the tribe. Here in Gayā, the Bhuiyās claim descent from Rikhiāsan, or Rukhminia as they call him, and two legends are current to explain the name of the caste. One relates that Rukhminia brought the land (*dhūmi*) under the plough near the Dhaulagiri mountain, and that he and his descendants were consequently called Bhuiyās, though members of the caste also style themselves Rikhiāsans. The other is that an embankment having been breached by a flood, no one was able to repair it and save the crops from destruction, until Rukhminia came with his four brothers and rebuilt it in a single night. This act gave him the name of Bhuiyā or saviour of the land—a designation which was not regarded as in any way disparaging until a river god managed to get the Bhuiyās to eat the flesh of an unclean beast in revenge for the repair of the embankment. Thenceforward Rikhiāsan and his descendants were a despised and degraded race. Other legends relating the cause of their fall to their present low position are common in Gayā, *e.g.*, that they were created by Mahādeo to do the work of menials, and that once upon a time a dead body having to be removed from Mahādeo's house, no one but the descendants of Rukhminia would obey his orders and carry it out. All the legends however point to the Bhuiyās having been a great cultivating caste which became degraded on account of their unclean habits and manners.

The Rājputs of Gayā, like the Bābhans, generally follow Rājputs. agricultural pursuits. They were probably among the earliest

Aryan settlers in the district, which they wrested from the aboriginal tribes which had hitherto held it. They generally observe the same forms of worship as orthodox Hindus of good caste, but pay especial honour to Devī, a reverence explained by a legend about the special favour she showed to a Rājput, Jagat Deo Singh. When he was in attendance before the king at Delhi, Devī appeared as a woman dressed in sorry ragged raiment, and informed the king that only Jagat Deo could present her with suitable clothing. The king said he would give double what Jagat Deo did, and Devī thereupon put his and Jagat Deo's devotion to the test, by ordering Jagat Deo's head to be cut off. This having been done, she asked for the head of the king's son, which the king refused, and she then restored Jagat Deo to life.

Kahārs.

The Kahārs follow the occupation of cultivators, *pālki*-bearers, household servants and labourers. According to tradition, field-labour is their hereditary calling. The legend is that king Jarāsandha built a tower, close to which was a garden at Giriak on the northern border of the district: this tower, which is still known as Jarāsandha's *baithak*, has been identified by General Cunningham as a Buddhist stūpa erected over a goose in the monastery of Hansa Saughārāma. The garden was nearly destroyed by drought, and Jarāsandha offered the hand of his daughter and half his kingdom to any one who watered it in a single night from the Ganges. The chief of the Kahārs undertook the task, built a great embankment, and lifted the water by swingbaskets from the Bāwan Ganga, a rivulet running at its foot. The work was all but done, and Jarāsandha was in despair at having to marry his daughter to a Kahār, when the *pipal*-tree came to his rescue and, assuming the form of a cock, crowed loudly. The Kahārs, thinking it was morning, fled at once, leaving their task unfinished, in fear of the king taking vengeance on them for presuming to seek an alliance with him. The king, however, gave them their wages, 3½ seers of food, and that amount has ever since been the Kahār's daily wage.

Dosādhs.

The Dosādhs also support themselves by labour and cultivation, but many of them are notorious thieves, and as a community they are reckoned among the criminal classes of the district. They are, as a rule, of a low type and appear to have traces of an aboriginal descent. The main features of their worship are the

sacrifice of pigs and the libation of liquor, and their ceremonies generally terminate in a drunken feast on swine's flesh. Like the *Dosādhs* and *Dhāngars* of Northern India, they observe a curious ceremony in honour of *Rāhu*, the demon of eclipse. A long shallow trench is dug outside the village, and the officiating *Dosādhs*, called the *bhagat*, sleeps in a hut close by on the night before the ceremony. Near the trench two long bamboo poles are erected with two swords fastened, edge downwards, across them. The trench is filled with mango wood, over which *ghī* is sprinkled, and the wood is then burnt. When the flames have burnt down, the *bhagat* passes over the live embers followed by the assembled people. This passing through the fire is regarded as a kind of exorcism; only those who are possessed by an evil spirit are affected by the fire, and any burn is a sign of their deliverance from demoniacal possession. Near the trench is a pot full of *khīr* (rice boiled in milk), which when boiling must be stirred by the bare hand of the *bhagat*. The latter mounts the swords, and sacrifices a boar and a pig, the flesh of which is then devoured by the worshippers together with the *khīr*. The remnant, if any, is burned before the next sunrise. This ceremony is generally performed in *Māgh* (January-February), but it is not necessarily periodical, as it is resorted to in order to obtain deliverance from any illness or trouble.

CHAPTER VII.

PUBLIC HEALTH.

VITAL
STATISTICS.

A COMPARISON of vital statistics for any but recent periods is rendered impossible by the changes in the system of registering births and deaths which have taken place from time to time. In 1869 the duty of reporting deaths was imposed on the village *chaukidars*, and in 1876 the system was extended to births; but the returns received were so incomplete that they were soon discontinued, and, except in towns, deaths alone were registered until 1892, when the collection of statistics of births as well as of deaths was ordered, and the system now in vogue was introduced.

So far as they can be accepted, and they are sufficiently accurate for the purpose of calculating the approximate growth of the population and of showing the relative healthiness or unhealthiness of different years, the returns submitted since that year show that during the nine years ending in 1900 conditions were generally unfavourable. During the earlier years fever was very prevalent, and twice (once in 1892 and again in 1894) the number of reported deaths exceeded that of the births. Later on the ravages of disease were not so severe, but in 1897 the outbreak of cholera again caused the deaths to exceed the births. Taken as a whole, the births during this period exceeded the reported deaths by about 60,000. In six of these nine years the death-rate exceeded 30 per mille, and in 1894 the ratio was as high as 47·24 per mille, the highest percentage ever recorded in this district. On the other hand, the birth-rate, though it never fell below 30 per mille, never rose above 40 per mille, except in the two last years, when it reached the high percentages of 50 and 43 per thousand. Since 1900, owing to the opening of new lines of railway and the comparative prosperity which has resulted, the

population has been far more progressive, in spite of the terrible visitations of plague to which it has been subject; and the increase in births has been very marked, the ratio ranging from 42.6 to 51 per mille; the latter figure, which was reached in 1904, represents a higher birth-rate than any previously recorded in Gaya. The excess of births over deaths in these 4 years has been nearly 86,000 and would indeed have been still greater, had not the number of the latter been swelled by the unusual mortality of 1901, when the death-rate rose to 45.68 per mille. This increase in the number of births is all the more noticeable, as the death-rate in the quinquennium 1900—04 was 37 per mille as compared with 32 per mille in the previous 5 years.

According to the returns submitted year by year, by far the greatest mortality is due to fever, but the ignorant *chankīdār* responsible for the returns is far from being a medical expert. Drawn as he often is from the lowest dregs of the people, he can diagnose only a few well-known diseases like cholera and small-pox, and many others are indiscriminately classed under the general head of fever. It may, however, safely be assumed that when the mortality ascribed to fever is unusually high, the greater part of the excess is due to malarial affections, and it is noticeable that in seven out of the last ten years the average mortality from fever in the district has exceeded that for the Province as a whole. Year by year the number of deaths from fever varies between 40,000 and 60,000, and it has been known to rise to over 70,000. This occurred in the unhealthy year of 1894, when fever accounted for a mortality of 33.52 per mille; and only once in the decade (in 1898) has the death-rate fallen below 20 per mille. Regarding the types of fever prevalent the Civil Surgeon, Major C. E. Sunder, I.M.S., writes:—"The commonest type of fever in this district is what for want of a better name has been called 'simple continued', and which the writer believes to be due to the vicissitudes of temperature occurring in the district, to which the heat mechanism of the body is unable to accommodate itself, and it is therefore thrown out of gear. Malaria accounts for about 33 per cent. of all the fevers. This figure is based upon microscopical examination of the blood in about 200 cases, and must be accepted with reserve. When found the malarial organism is usually the 'benign tertian,' in two generations causing a quotidian, and

PRINCIPAL
DISEASES.

Fever.

not a true tertian ague. The 'malignant tertian' is uncommon, and the quartan parasite is rarely found. Almost all the other specific fevers occur in Gayā, but the only one that calls for notice is typhoid which certainly does occur among natives, as has been verified clinically and by *post mortem*. Of the eruptive fevers measles is exceedingly common, and chicken-pox and small-pox come next. Typhus has not been seen."

Bubonic plague first appeared in epidemic form in the district in October 1900. It broke out in the town of Gayā, but subsequently spread over almost the whole of the district, and continued its ravages up to May 1901. The mortality during this period was appalling; and though the returns show that only 1,133 deaths were due to plague in 1900 and 10,790 deaths in 1901, there is no doubt that much of the mortality reported as due to fever was really caused by plague. The deaths ascribed to the latter disease suddenly increased by 11,000 in 1901 and as suddenly dropped by 22,500 next year—a most suspicious variation; and it is reported that the actual number of deaths caused by plague in these eight months was over 26,000. Since then plague has been an annual visitation, though there has not been such heavy mortality as during the first epidemic. Some sporadic cases appeared in 1902, and in the next year the disease recurred with great severity, the total number of deaths aggregating 1,000 in spite of the immunity of the district during the months June to October. There was then a recrudescence of the disease, and the epidemic continuing to prevail until late in the year, the mortality rose in 1904 to nearly 7,000. It raged with even greater virulence in the beginning of 1905, in the first three months of which it accounted for over 10,000 deaths, the severity of the epidemic being aggravated by unusual cold and storms in January and February.

Throughout these years the disease has pursued a regular course, decreasing or disappearing entirely in the hot and rainy weather months, reappearing after the rains, and reaching its climax in the cold weather. In his report for 1904 the Civil Surgeon states:—"Plague may now be considered as having become endemic. The outbreak that began in November 1903 lasted well into the year under report, and cases continued to occur until the hot days of April. It now appears always to be at its worst in the

cold months, and directly it appears in the town, an exodus of the people takes place, which spreads the disease still further. Even stricken patients are carried away in the exodus. Disinfection, dessication and evacuation are adopted, but the first can seldom be done thoroughly on account of the opposition, the second seems of as little use, and the last, while saving the individual in the present, does nothing to obviate reinfection in the future."

To this it should be added that inoculation has found more favour among the people of Gayā than anywhere else in Bengal, and especially during the first epidemic in the cold weather of 1900-01. At first they were doubtful of its value, but after its effects had been experienced, they came forward with great readiness to be inoculated by the Civil Surgeon and the trained medical officers deputed for the purpose, and during this epidemic some 23,000 persons were inoculated of their own free will. These operations afforded striking evidence of the value of the measure as a preventive of plague. In Gayā town some 3,716 persons were inoculated up to the 31st March 1901; of these, 31 were subsequently attacked by plague, but only 4 persons died, and three of these died within 10 days after inoculation, *i. e.*, they may have had the disease before inoculation, as the plague germ is supposed to incubate for 8 or 10 days, so that a person may not develop signs of the disease till after that period. Among the uninoculated inhabitants of the towns about 2·8 per cent. were attacked and 2·7 per cent. died; and taking all cases of suspected fever as well as admitted plague, 8·3 per cent. were attacked and 8·2 per cent. died, whereas among the inoculated 1·2 per cent. were attacked and 0·2 per cent. died. In other words, taking only cases admitted to be plague, the proportion of deaths among the uninoculated was 14 times as great as among the inoculated; and taking all deaths from suspected fever as well, the greater part of which were undoubtedly caused by plague, we find that the proportion of deaths among the uninoculated was 41 times greater than among those protected by inoculation. In the district as a whole, there were 12 cases, so far as authentic information can be obtained, in which those who had been inoculated died, and only one person—and that a doubtful case of plague—died after the 10 days' period: in the case of the uninoculated most of those who were attacked died. The readiness with which the people took to

inoculation was almost entirely due to the popularity of the local officers and the wholesome influence they exercised; and though the striking results attained during the first epidemic have not been repeated, inoculation still continues to be more popular than elsewhere in the Province; in 1904 the number inoculated (840) was as great as in all the other Bengal districts.

Other
diseases.

After fever and plague, the greatest mortality is caused by cholera, which appears in epidemic form at times and carries off large numbers of the people. During the last decade it has raged with especial virulence every three years, causing a mortality of 7.64 per mille in 1894, of 3 per mille in 1897, of 5.79 per mille in 1900, and of 2.76 per mille in 1903. Small-pox also visits the district every year, but its ravages are not very severe, the death-rate due to it only exceeding 1 per mille in 1897 and 1902. Dysentery and diarrhoea are fairly common, but the only diseases specially prevalent in the district are cataract, stone, hydrocele and lymph scrotum, as well as other reputed filarial diseases. An enquiry has been made with the object of testing the interesting hypothesis that the prevalence of stone is due to a deficiency of salt in the diet of the people; and though there appears to be no doubt that common salt is deficient in their usual diet as judged by ordinary physiological standard diets, the data obtained were insufficient to establish any definite conclusions. In the opinion, however, of the Civil Surgeon it seems beyond dispute that hard water and an excessively dry climate are potent factors in the etiology of lithiasis. Similarly, the glare and dust accompanying the hot dry climate of Gayā predispose to cataract, and blindness is unusually common, the proportion of persons afflicted being 145 per 100,000 among males and 138 per 100,000 among females. The number of persons suffering from elephantiasis is also great, and in Gayā town particularly it is a common sight to see numbers both of men and women walking about the streets with enormously swollen legs and feet. Lepers are also unusually common, and at the census of 1901 it was found that leprosy was more frequent than in any other Bihar district, 102 per 100,000 males and 16 per 100,000 females being lepers. The great disproportion is probably due mainly to the fact that male lepers travel further from their homes and leave their homes in greater numbers in order to beg at Gayā, where a long string of men in all stages of

this loathsome disease may be seen on the way to the Vishnupad temple imploring the charity of the passers-by.

Outside the municipalities proper methods of sanitation are almost unknown, in spite of the measures taken by the District Board to clear rank undergrowth, fill up unhealthy hollows and sweep selected villages. The tendency of the people is towards aggregation, and instead of living in hamlets, each nestling within its own belt of trees, as in Bengal, they cluster in closely-packed villages, usually consisting of a main street with narrow and ill-ventilated side lanes. The sanitary conditions are extremely primitive, while the apathy of the people and the unwholesome habits to which they are rooted render the task of village sanitation on any appreciable scale most difficult. Within municipal areas there is a regular system of conservancy, night-soil and other refuse are removed, and steps are taken to protect the sources of water-supply, but none of them have a regular system for the supply of pure water or an adequate scheme of drainage. Like the villages, they suffer from crowded and badly-aligned blocks of houses intersected by narrow lanes, and the mortality from plague, dysentery and cholera is generally greater than in the rural areas. In the town of Gayā special sanitary precautions are necessitated by the large influx of pilgrims every year, and the Lodging-house Act is in operation. The lodging-houses provided for pilgrims are licensed; they are regularly inspected, and measures are taken to see that their sanitary arrangements are adequate and that an improper number of pilgrims are not accommodated in them. As cholera often follows the pilgrim train, the Lodging-house Fund also maintains a cholera hospital, at which cholera and other contagious diseases are treated.

The opposition to vaccination was formerly very strong, and 35 years ago it was reported that nothing short of compulsion would ever induce the people to submit to the operation. The popular belief was that vaccination provoked the goddess Sitalā, who presides over small-pox, to visit the offence with small-pox in a deadly form, and the objection to vaccination was consequently very deeply rooted in the minds of the people. This prejudice has passed away, as the people now realize its efficacy, and, though vaccination is compulsory only in municipal areas, it has steadily gained ground except among a few bigoted classes. More than 20

SANITA-
TION.VACCINA-
TION.

per cent. of the population were protected against small-pox in the seven years ending in 1905, and during the ten years 1895-96 to 1904-05, the number of successful vaccinations increased from 43,000 to over 61,000; the average during the last four years of the decade was as high as 64,000. In spite of the fact that plague has created additional difficulties and impeded the work considerably, the ratio of persons successfully vaccinated in 1904-05 was 29.46 and in the preceding five years 28.30 per thousand of the population. Statistics of vaccination from 1892-93 to 1901-02 will be found in the Statistical Appendix.

MEDICAL
INSTITU-
TIONS.

Thirty years ago there were only five dispensaries in the district, viz., the Pilgrim Hospital at Gayā and four branch dispensaries at Aurangābād, Jahānābād, Nawāda and Sherghāti. There are now three hospitals at Gayā itself—the Pilgrim, Cholera and Zanāna Hospitals, and 12 dispensaries in the outlying parts, situated at Arwal, Aurangābād, Dāūdagar, Deo, Fatehpur, Jahānābād, Khizrsarāi, Nabinagar, Nawāda, Rafiganj, Sherghāti and Tekāri. The number of persons served by each dispensary is 93,092, and in 1904 the average number of patients treated was 66 per mile of the population. The total number treated annually has risen from 52,000 in 1894 to 99,000 in 1904 and the daily average number from 668 to 1,071. The amount expended on dispensaries during the five years 1899—1903 was over $2\frac{1}{2}$ lakhs of rupees,—a sum exceeded only in two other districts in Bengal (Dacca and the 24-Parganas); Rs. 72,000 was received from subscriptions, and the ratio of these subscriptions to the total expenditure was thus 28.31 per cent.—a somewhat low proportion. Besides these institutions, there are 441 medical practitioners; of these only 54 have diplomas.

By far the largest number of patients are treated for fever and next to that for skin diseases; ear diseases and venereal diseases come next in frequency, followed by eye diseases. Cataract operations are very numerous, and during the five years 1896—1900 successful operations of this nature were performed in the case of 874 males and 543 females—a total exceeded only in the adjoining district of Shāhābād. All the hospitals and dispensaries, except those at Deo, Fatehpur, Khizrsarāi, Nabinagar and Rafiganj, have accommodation for in-patients; they contain altogether 95 beds for men and 73 beds for women. Statistics of the daily attendance,

Indoor and outdoor, during the years 1892—1901 will be found in the Statistical Appendix; and a statement of the receipts and expenditure, and of the principal diseases treated at each dispensary in 1904-05, is given at the end of this chapter.

The premier medical institution in the district is the Gayā Pilgrim Hospital, so called because it is specially intended for the medical relief of the pilgrims who visit the shrines at Gayā or pass through it on their way to other sacred places; in recognition of the services thus rendered a large contribution is made to its upkeep by the Pilgrim Fund known as the Lodging-house Fund. There are two separate buildings, the one for male patients and the other for female patients, the former of which contains eye, surgical and medical wards; and there are altogether 80 beds, of which 50 are in the male ward, 22 in the female ward and 8 in the pauper ward. The hospital also contains a separate building for moribund patients, an operation room, well equipped with modern aseptic appliances and surgical instruments, and a laboratory in which clinical bacteriology is carried on. The principal cases treated are fever, and eye, ear, skin and venereal diseases. Practically every operation known to modern medical science has been carried out, but operations for cataract and stone in the bladder predominate.

The Lady Elgin Zanāna Hospital, which was established in 1895 for *pardānashin* women, is in charge of a lady-doctor. It is a large and well-equipped building, containing 28 beds, and is also provided with cottage wards. It has acquired considerable popularity in the district and is doing much excellent work.

Gayā
Pilgrim
Hospital.

Gayā
Zanāna
Hospital.

| NAME OF DISPENSARY. | Operations. | DISEASES TREATED. | | | | |
|-----------------------------|-------------|-------------------|----------------|---------------|-------------------|---------------|
| | | Fever. | Skin diseases. | Ear diseases. | Veneral diseases. | Eye diseases. |
| Gaya { Pilgrim Hospital ... | 1,912 | 1,126 | 2,428 | 2,98 | 1,028 | 1,450 |
| Cholera | 525 | 731 | 464 | 821 | 323 | 163 |
| Zanana | 648 | 386 | 401 | 409 | 583 | 464 |
| Arwal Dispensary ... | 381 | 1,042 | 924 | 339 | 581 | 337 |
| Aurangabad | 222 | 2,116 | 608 | 464 | 463 | 320 |
| Dadnagar | 286 | 739 | 620 | 404 | 210 | 218 |
| Deo | 149 | 701 | 737 | 271 | 219 | 123 |
| Fatehpur | 97 | 1,069 | 922 | 133 | 474 | 167 |
| Jahanabad | 403 | 1,610 | 1,558 | 766 | 707 | 519 |
| Khizrarai | 88 | 1,076 | 348 | 213 | 277 | 207 |
| Nabinagar | 181 | 687 | 1,211 | 566 | 78 | 186 |
| Nawada | 291 | 1,407 | 1,142 | 1,069 | 670 | 611 |
| Rafganj | 262 | 628 | 650 | 210 | 294 | 314 |
| Sherghati | 399 | 1,137 | 691 | 112 | 57 | 155 |
| Tekari | 794 | 1,427 | 514 | 400 | 347 | 683 |
| Total ... | 6,449 | 16,272 | 13,318 | 8,365 | 6,311 | 4,237 |

| NAME OF DISPENSARY. | RECEIPTS. | | | | EXPENDITURE. | |
|-----------------------------|--------------------------|----------------|------------------|----------------------------------|----------------|----------------------------------|
| | Government contribution. | District Fund. | Municipal Funds. | Subscriptions and other sources. | Establishment. | Medicines, diet, buildings, etc. |
| | Rs. A. P. | Rs. A. P. | Rs. A. P. | Rs. A. P. | Rs. A. P. | Rs. A. P. |
| Gaya { Pilgrim Hospital ... | ... | 6,115 0 0 | 5,877 0 0 | 4,517 0 0 | 5,008 0 0 | 10,984 0 0 |
| Cholera Hospital ... | ... | ... | ... | 1,744 0 0 | 743 0 0 | 902 0 2 |
| Zanana Hospital ... | ... | 3,300 0 0 | 600 0 0 | 7,233 0 0 | 5,962 0 0 | 1,588 0 0 |
| Arwal Dispensary ... | 300 0 0 | 546 13 9 | ... | 300 0 0 | 943 4 6 | 203 9 3 |
| Aurangabad | ... | 723 14 11 | ... | 233 11 0 | 4 3 8 0 | 507 1 11 |
| Dadnagar | 195 0 0 | ... | 522 3 6 | 122 12 2 | 467 5 8 | 373 10 3 |
| Deo | ... | ... | ... | 1,800 3 6 | 519 0 0 | 981 3 6 |
| Fatehpur | ... | 855 7 10 | ... | 32 12 0 | 646 4 1 | 215 6 5 |
| Jahanabad | ... | 486 2 7 | ... | 464 1 6 | 515 6 0 | 434 13 3 |
| Khizrarai | ... | 1,237 7 0 | ... | ... | 749 0 0 | 488 7 0 |
| Nabinagar | ... | 831 0 0 | ... | ... | 510 0 0 | 321 0 0 |
| Nawada | ... | 1,390 9 2 | ... | 698 11 4 | 563 9 4 | 629 0 6 |
| Rafganj | ... | 1,014 0 0 | ... | 63 0 0 | 699 0 0 | 314 0 0 |
| Sherghati | ... | 968 0 0 | ... | 42 0 0 | 402 0 0 | 518 0 0 |
| Tekari | ... | ... | ... | 3,761 9 2 | 3,011 14 6 | 739 10 8 |
| Total ... | 405 0 0 | 17,468 7 3 | 9,999 3 6 | 20,960 12 8 | 21,283 4 1 | 18,598 14 9 |

(a) Of this sum, Rs. 3,500 was contributed by the Gaya Lodging-house Fund.

(b) This hospital is maintained by the same Fund.

(c) This dispensary is maintained by the Deo Raj.

(d) " " " " " Tekari Raj.

CHAPTER VIII.

AGRICULTURE.

THE average annual rainfall of Gayā is about 45 inches, but owing to the position of the district, it receives a full supply from neither monsoon, and the rainfall is frequently deficient, fitful or untimely. Besides this, the general slope of the country and the nature of the soil render the land very unretentive of moisture, and the local rainfall would therefore play a comparatively minor part in the agricultural industry of the district, were it not for artificial works of irrigation. Owing to the conformation of the surface, water is carried off so rapidly into the rivers that artificial measures for storing water and leading it from the rivers by channels (locally known as *pains*) are indispensable. It is this necessity that has given rise to the network of *pains* and the thousands of artificial reservoirs, called *āhars*, which are scattered over the district; and it is on these sources of supply that the people almost entirely depend, except in the west near the Son, where a considerable area is irrigated from the Patna-Gayā canal and its distributaries.

GENERAL
CONDI-
TIONS.

As already stated, the drainage flows northwards to the Ganges from the Chotā Nāgpur plateau on the south, finding its outlet through a series of rivers and hill torrents, nearly all of which dry up after the rains are over. The district is thus divided into a number of parallel strips, each of which again slopes down to the river-beds on either side. The high land in the middle, which is known as *tānr*, is of poor fertility; it can only be irrigated from *āhars*, and grows chiefly *rabi* and *bhadoi* crops. This *tānr* land is most extensive in the south, but towards the north, where the surface is more level, the land is more easily irrigable. Most of the fields are supplied with water from the channels taking off from

the rivers as well as from *āhars*, and the low lands near the rivers are generally sown with rice, which is the principal crop grown.

TRACTS OF
FERTILITY.

It has been explained in Chapter I that the district of Gayā may be roughly divided into two tracts, that to the north well irrigated and fairly fertile, and that to the south sparsely populated, densely wooded and indifferently cultivated. The northern portion of the district, which constitutes about two-thirds of the whole area, is fairly level and is mostly under cultivation. In the south the rise towards the hills of Chotā Nāgpur is more rapid; the country is more intersected with hills and ravines; and the proportion of sand in the soil washed down from the hills is much larger. Cultivation in this tract is consequently much more scanty, and a large area is composed of hill and scrub-covered jungle extending for several miles below the hills.

Though the district is divided broadly into these two large tracts, there are four minor subdivisions * with different degrees of fertility. The first, or fertile, tract comprises the Jahānābād subdivision and the western canal-irrigated strip of the Aurangābād subdivision, the whole tract consisting of Jahānābād and Arwal thānas, and of a portion of Dāūdagar thāna. The western portion of this tract has the benefit of canal irrigation, while the northern and eastern portions are intersected by *pains* or irrigation channels leading from the rivers Morhar and Mohāna. Moreover, the greater part of this portion of the district was once the basin of the Son river itself, and the soil being largely composed of old alluvial deposit is naturally more productive than elsewhere.

The second, or moderately fertile, tract consists of two areas, the first being composed of thānas Gayā, Tekāri and Atri in the centre of the district, and the second of thāna Nabinagar in the extreme south-west. These areas have also the benefit of ample irrigation from several rivers, and there are very few villages which have not either a *pain* or sub-channel (*śhoklā*) leading off from some efficient source of water-supply.

The third, or less fertile, tract also consists of two areas—the first being the Nawāda subdivision, and the second the rest of the Aurangābād subdivision, consisting of thāna Aurangābād and of a portion of thāna Dāūdagar. Only about half the villages in these two areas are sufficiently irrigated, and moreover, the *pains*

* See Grierson's Notes on the District of Gayā, pp. 81-82.

that do exist only give an adequate supply of water in years of good rainfall.

The fourth, or infertile, tract consists of thānas Shergāti and Bārāchatti, or the southern half of the headquarters subdivision. Besides containing extensive tracts of jungle, there are few *pains*, and only about ten per cent. of the villages are irrigated. Hence paddy is little cultivated, as compared with the rest of the district, and is liable to failure in a moderately bad year.

In the northern tract the soil is generally alluvial, consisting chiefly of *pauru*, a loam with a small proportion of sand, and *kewāl*, a species of hard stiff clay, opening out, when dry, in gaping fissures, which make cross-country riding impossible. In the south a great part of the existing sub-soil has been deposited by diffusion from the hills, the rivers issuing from which carry along with them quantities of hard white and yellow sand; this accounts for the large proportion of sand in the soil and for the large areas which are almost entirely composed of sand. This sandy soil is called *balwat*, *balmat* or *ba'sundrī*. In some places also there is a white soil called *rehra*, which is rendered more or less useless by being impregnated with carbonate of soda; when the impregnation is so great as to render it unculturable waste, it is known as *ūsar*. The presence of carbonate of soda (*rah*) in paddy land does not, however, seem to make it infertile, the soda being presumably dissolved by the water. *Pauru* soil is best adapted for the cultivation of paddy, though in the area irrigated from the canals even sandy soils produce fine paddy; it requires irrigation, and gram is almost the only crop that can be raised without it. *Ke-wāl* clay is best suited for *rabi* crops, as it retains moisture longer, and the *rabi* has to depend to a great extent on sub-soil moisture.

SOILS.

The crops grown in Gayā are divided into three great divisions—the *aghani*, *bhadoi* and *rabi* crops. The *aghani* is the winter crop of rice which is cut in the month of Aghan (November-December), the *bhadoi* is the early or autumn crop, reaped in the month of Bhādo (August-September), consisting of 60 days' rice, *maruā*, *kodo*, Indian-corn, millets and less important grains; while the *rabi* crop, which is so called because it is harvested in the spring (*rabi*), includes such cold-weather crops as gram, wheat, barley, oats, and pulses. Out of the total

PRINCIPAL CROPS.

normal cropped area, 57.5 per cent. grows *aghani*, 31.8 per cent. grows *rabi*, and only in 9.4 per cent. is *bhadoi* raised. The latter is, therefore, relatively an unimportant crop, and the people are mainly dependent on the *aghani* rice, and secondly on their *rabi* crops.

RICE.

Aghani
rice.

Rice, which occupies a normal area of 1,338,300 acres, is the staple crop of the district. The *aghani* or winter rice forms the greater part of this crop, and is raised on over 1,318,000 acres. It is sown broadcast after the commencement of the rains in June or July on lands selected for seed nurseries, which have previously been ploughed three or four times. After four or six weeks, when the young plants are about a foot high, they are generally transplanted; each plant is pulled out from the land, which is soft with standing water, and planted again in rows in flooded fields, in which the soil has been puddled. After this the rice is left to mature, with the aid of water, till towards the end of September. The water is then drained off and the fields are allowed to dry for 15 days, and at the end of that time they are again flooded. It is this practice, known as *nigār*, which makes the rainfall, or failing that, irrigation essential to successful harvest. These late rains (the *Hathiyā*) are the most important in the year, as not only are they required to bring the winter crops to maturity but also to provide moisture for the sowing of the *rabi* crops. Should no rain fall at this period, or if water cannot be procured from artificial sources, the plants will wither and become only fit for fodder; but if seasonable showers fall or the crops are watered from *āhars*, *pains* or canals, the rice comes to maturity in November or December.

Other
kinds of
rice.

Some winter rice known as *bāog* is not transplanted; it is sown broadcast on low lands at the commencement of the rains, and also in years in which there has not been sufficient moisture to allow of transplantation at the proper time. The *bhadoi* rice, which covers 20,000 acres, is also sown broadcast in June or July and not transplanted; it is regarded as a 60 days' crop, and is generally harvested in August or September. There is another kind of rice, known as the *boro* or spring rice, which is sown in January, transplanted after a month and cut in April. It is grown only on marsh lands and in the beds of shallow streams, and the area cultivated with it is insignificant.

A noticeable feature of rice cultivation is the way in which it is conducted religiously according to lunar* asterisms (*nakshatras*). The seed-beds throughout the country are, if possible, sown within a period of 15 days, called the *Adra nakshatra*, which lasts from about the 20th June to the 5th July. Transplantation from the seed-beds goes on during the *Punarbas*, *Pukh*, and *Asres nakshatras* (18th July—15th August). The water on the fields in which the young plant has grown up after transplantation is regularly drained off in the *Utra nakshatra* (12th—25th September)—a period when, as a rule, there is little rain; and after the exposure of the soil to the air and sun, the usual heavy rain of the *Hathiyā nakshatra* (26th September—7th October) is awaited. After this, it is the universal custom to keep the fields wet during the *Chitra nakshatra* (8th—20th October); and at the commencement of the *Siwāti nakshatra* (21st October—3rd November) they are again drained, and the paddy is left to itself till the *Bisākha nakshatra* (4th—15th November) when it is cut.

Although there are sometimes slight variations in the times of sowing and transplanting from those given above, yet the cultivators are always extremely strict in draining off the water from the fields in the *Utra nakshatra*. It may be said that every cultivator begins, if he possibly can, to let off the water on the first day of that *nakshatra*, and this is done, without any hesitation, in the country commanded by the canals, because the cultivator looks to the Irrigation authorities to supply him with water, whether the *Hathiyā* rain fails entirely or not. It is generally agreed that after this draining (*nigār*), rice plants cannot exist for more than from 15 to 20 days, unless watered, without rapid deterioration; and as no ryot will, under any circumstances, take water till the *Hathiyā nakshatra* has commenced, the Canal Department is called upon to irrigate within a very few days every acre under lease. If water is delayed a week after it is wanted at this stage, the crop suffers; if it is delayed three weeks, it withers beyond redemption.

The *bhadoi* crops require plenty of rain with intervals of bright sunshine to bring them to maturity, and constant weeding is necessary for a good harvest. The time of sowing depends in

BHADOI
CROPS.

* As the *nakshatras* are calculated according to phases of the moon they vary slightly from English dates, but the greatest variation is only five days.

the breaking of the monsoon; if the rainfall is early, they are sown in the beginning of June; but they can be sown as late as the middle of July without the prospect of the crop being lost. Harvesting usually extends from the 15th July to the 15th October.

The principal *bhadoi* crop is *maruā* (*Eleusine Coracana*), a valuable millet, occupying a normal area of 77,000 acres, which is sown at the commencement of the rainy season and cut at the end of it. It is partly sown broadcast and partly transplanted to ground that afterwards gives a winter crop. The grain is largely consumed by the poorer classes in the form of *sattu*, or is converted into flour and made into a coarse bread; in bad seasons, when the rice crop fails, it supports the people till the spring crops have been harvested.

Next in importance to *maruā* comes maize (*Zea Mays*), or Indian-corn (*makai*), which is raised on 63,000 acres; it is sown from the 20th June to the 20th July, and cut from the 15th July to the 15th August. Besides being consumed in the form of bread, or as *sattu*, the young ears while still green are often parched in the cob, and so eaten. Among millets *jowār* (*Sorghum vulgare*) is grown on 19,000 acres, and *kodo* (*Paspalum scrobiculatum*) is a favourite crop sown on poor lands early in the rains and reaped after they are over. It is a millet cheaper than rice, which is popular with the poorer classes, as it can be readily grown on an inferior soil; it is eaten boiled like rice or sometimes in *chapātis*, but is not very nutritious. The chief oil-seed grown at this time of the year is *tīl* or gingelly (*Sesamum indicum*) which is sown in July and reaped in September; its total acreage is about 10,000 acres. The castor-oil plant (*Ricinus communis*) is sown from the 20th June to the 1st August and is cut from the 29th December to the 30th April.

Ploughing of the fields for the *rabi* crops commences early in the rains and is continued at convenient intervals, sufficient time being given to allow the upturned soil to be exposed to the air. In the case of clay soils in unirrigated parts, more frequent ploughing is necessary for all *rabi* crops, because otherwise the soil would become so hard that if there was no rain at the sowing time, a crop could not be sown. The time of sowing *rabi* is generally regulated by two circumstances—the heavy rains of the

Hathiyā nakshatra (26th September to 7th October) and the approaching cold season. If sown too late, the plants will not become strong enough to resist the cold; if sown too early, the heavy rain will probably drown the seed and sprouting crop, and so necessitate re-sowing. The cultivators are thus anxious to sow as soon as the heavy rains have ceased, and the general rule is that the proper time for sowing most *rabi* crops is the *Chitra nakshatra* (8th to 20th October), and that it must not be delayed beyond the *Sivātī nakshatra* (21st October—3rd November). A sufficient supply of water is essential at this time; later on several waterings are required, and if there is no rain, the crops have to depend on well irrigation. They are finally harvested between the last week of February and the middle of April.

The most important of the cereals is wheat, which occupies altogether 134,000 acres. It is generally sown broadcast on sandy soil, and requires as a rule four waterings. It is frequently sown on lands from which a crop of early rice has been taken, and is often sown together with barley, or with gram, mustard or linseed. The stubble is grazed by cattle, and the pounded straw (*bhūsa*) is used as fodder. About half the area under wheat, or 70,000 acres, is occupied by barley (*Hordeum vulgare*), which is sown partly with wheat, partly by itself, and partly with pulse. Like wheat, barley is sown broadcast and requires four waterings.

The other great class of *rabi* crops consist of pulses, of which gram or *būnt* (*Cicer arietinum*), is by far the most extensively grown, as a normal area of 96,000 acres is given up to it. Besides forming an excellent fodder for fattening horses, this pulse is eaten by the natives in all stages of its growth. The young leaf is eaten, and the grain is split and converted into *dāl*, or pounded into *sattu*. Among other crops may be mentioned peas, the *chīna* millet (*Panicum miliaecum*), *kulthī* (*Dolichos biflorus*) and various pulses and lentils, such as *rahar* (*Cajanus indicus*), *masurī* (*Ervum Lens*) and *khesūrī* (*Lathyrus sativus*). The crop last named is frequently sown broadcast among the rice stubble. It requires no care, and the grain is eaten, in the form of *dāl* or as flour cooked in *ghī*, by the poorer classes. If eaten in excess, it produces a form of paralysis known as lathyrism.

Oil-seeds occupy an important position among the *rabi* crops. The chief is linseed (*Linum usitatissimum*), which is grown on a

Oil-seeds.

normal area of 80,000 acres. It now forms one of the chief articles of export, and every year many thousands of maunds are sent out of the district. The other principal oil-seeds are mustard and rape, which are raised on 22,000 acres.

OTHER
CROPS.
Cotton.

The fibre crops of Gayā are inconsiderable, the normal area under cultivation being only 1,000 acres. Thirty years ago the cultivation of cotton was carried on to a considerable extent in the Jahānābād subdivision, and also in the Nawāda subdivision and to the west of the district about Dāūd-nagar; and in the beginning of last century it was much more extensive, as the cloth factories at Jahānābād, Dāūd-nagar and elsewhere created a demand for the raw product. The local cotton industry has now been ruined by the competition of imported piece-goods, and the area under cotton has shrunk till it now amounts to only 300 acres.

Indigo.

Indigo is another crop the cultivation of which has been practically abandoned, though it has never really flourished in Gayā. In 1812 Dr. Buchanan Hamilton wrote that indigo was of little importance and its cultivation was on the decline. Later, however, European enterprise took up the industry, and several factories were established in the west of the district. There was a large indigo concern at Sipāh, commonly known as the Arwal concern, and a factory at Tararh near Dāūd-nagar, with outworks at Pura, a hamlet of Kaler village on the Son, and at Baghoi on the banks of the Pūnpūn, the whole being known as the Dāūd-nagar concern. The industry with difficulty survived the Matiny, when all the factories were dismantled and the labourers dispersed, and from that time its growth rapidly declined until 1878, when the introduction of the Son canal system converted the poorest lands in this part into the most fertile. Indigo was then entirely dropped, giving way to zamindāri management, a safer and more profitable undertaking. The cultivation is now practically extinct, and indigo is grown only on 100 acres.

Opium.

Of the other crops raised in Gayā, poppy is by far the most important, as not only is the normal area under the plant considerable (51,000 acres), but the price obtained for the crude opium renders it a very valuable crop. The production of opium is a Government monopoly, and no person is allowed to grow poppy except on account of Government. Annual engagements are entered into by the cultivators, who, in consideration of the pay-

ment of an advance, agree to cultivate a certain quantity of land with poppy and to deliver the whole of the opium produced to the Government at a rate fixed according to its consistence, but subject to deductions for inferiority of quality. The best soil for poppy is loam, so situated that it can be highly manured and easily irrigated, and for this reason homestead land is generally selected. The cultivation requires much attention throughout the growth of the plant. From the commencement of the rains in June until October the ground is prepared by repeated ploughings, weedings and manuring, and the seed is sown in November. Several waterings and weedings are ordinarily necessary before the plant reaches maturity in February. After the plant has flowered, the first process is to remove the petals, which are preserved, to be used afterwards as coverings for the opium cakes. The opium is then collected during the months of February and March, by lancing the capsules in the afternoon with an iron instrument and scraping off the exudation the next morning. In the beginning of April the cultivators bring in their opium to the weighment centres of the different sub-agencies, where it is examined and weighed, and the balance due according to the Opium Officer's valuation is paid to them. Final adjustments are made in August, after the value of the drug has been ascertained by assay at the Patna Factory, where the final process of preparing the drug in balls or cakes is conducted.

There is a tendency for the cultivation of poppy to decrease, as year by year it is becoming less profitable to the ryots. The plant is delicate; a thoroughly favourable year comes only at uncertain intervals; and the cultivators have had to contend with a number of bad seasons. There is accordingly a marked tendency to withdraw from an industry so precarious and to substitute the more robust cereals or such paying crops as sugarcane, potatoes, chillies and vegetables. This movement has been quickened by the fact that the value of cereals has increased of recent years, while the price paid for the crude drug remains stationary; and in the decade ending in 1903-04, the area under poppy has decreased in the Gayā Sub-Agency from 58,900 *bighas* to 41,000 *bighas*, and in the Tehta Sub-Agency from 42,900 *bighas* to 41,000 *bighas*. Each of these Sub-Agencies is in charge of a Sub-Deputy Opium Agent, who sees to the execution of agreements to grow

opium, supervises the payment of advances to the cultivators, and checks the weighment of the crude produce and the payment of the sums due to the ryots. He has to satisfy himself that the land engaged for is cultivated with and fit for poppy, to test the measurements of it, to make advances for wells and see that they have been dug, and generally supervise the cultivation and control the subordinate staff.

Sugarcane.

The falling off in the area under poppy has been largely made up by the extension of sugarcane cultivation. In 1884 the area under sugarcane was estimated at less than 13,000 acres, but of recent years the crop has grown immensely in importance, and its cultivation has rapidly extended, so that the average area covered by it has increased to 30,100 acres during the five years ending in 1904-05. This increase is partly due to the introduction of the Son canal system in the west of the district, where sugarcane, potatoes and poppy, which could not otherwise have been raised, have been substituted for the ordinary food-grain crops. So great is the necessity of water for the growth of sugarcane that its cultivation in this tract before the era of the canals involved almost prohibitive labour on well irrigation, but this difficulty was removed by the regular supply of water afforded by the canals. Another powerful stimulus was given to the industry by the introduction of the iron roller mills worked by bullock-power, invented in 1874 by the proprietors of the Bihā estate in Shāhābād, and hence known as the Bihā mills. Some years indeed elapsed before their great superiority over the rude machines in use was recognized, but the ryot in spite of his conservatism learnt to appreciate their advantages; their popularity is now firmly established; and the old-fashioned appliances which necessitated the cutting up of the cane and extracted a mere fraction of the juice are now no longer seen.

Sugarcane is now one of the most profitable crops grown in the district in spite of the labour and expense its cultivation requires. It is a crop which not only exhausts the soil, but occupies the ground for a long period, extending over a year. It is planted during February or March, in cuttings of about a foot in length placed in rows about 2 feet apart. When the plant begins to sprout, it is well watered and the surrounding earth is loosened. Each plant grows into a cluster

of canes, which are generally ready for cutting in January or February. The crop requires great care, and must have 7 or 8 waterings, even if the other crops have to do without water in consequence.

Vegetables are cultivated in garden plots for household use, and also on a larger scale in the neighbourhood of towns. The most extensively grown are the potato, egg-plant or *baigun* (*Solanum Melongena*), ground-nut (*Trichosanthes dioica*), and pumpkins (*Lagenaria vulgaris*) and gourds (*Benincasa cerifera*), which may be seen climbing over the roofs of the houses in nearly every village. Onions, yams and cucumbers are also common, and in the winter radishes, carrots and melons are cultivated. Among condiments the favourite is the chilli, but turmeric, coriander and ginger are also grown in considerable quantities. The most popular fruit is the mango, which grows freely and forms a valuable addition to the food of the people during the hot weather, though the flavour of the local fruit is decidedly inferior to that of the Mālda and Bombay varieties. Of the other cultivated fruits, the commonest are the plantain, lemon, *lichi* (*Nephelium Litchi*), jack fruit (*Artocarpus integrifolia*), custard apple (*Anona squamosa*) and *bel* fruit (*Aegle marmelos*). The *kāajūr*-tree (*Phœnix sylvestris*) is cultivated abundantly for the sake of its juice, which is made into liquor; and the *mahuā* flower is used for the manufacture of country spirit, and is also eaten by the poorer classes, especially by those living near the jungles. The cultivation of the climbing vine call *pān* (*Piper betel*), the leaves of which are used to wrap up the *supāri* or areca-nut, chewed by natives of all ranks and classes, is carried on to a considerable extent at Ketāki and some neighbouring villages in the Aurangābād subdivision, and at Tungi and Deodha in the Nawāda subdivision.

VEGETABLES
AND FRUITS.

The total normal area under different crops is 2,292,700 acres, of which 194,300 acres are cropped more than once, so that the net cropped area is 2,098,400 acres. The returns for the five years ending in 1804-05 show, however, that the average cultivated area is 1,921,200 acres and the net cropped area 1,726,900; the proportion under *aghani*, *rabi* and *bhadoi* crops being 52·5, 38 and 9·5 per cent. respectively, and the area under cereals and pulses 1,631,800 acres and under oil-seeds 182,900 acres. This difference is apparently due to the fact that the area

AGRICUL-
TURAL
STATISTICS.

actually cultivated varies every year, and is often less than the normal area—a result due in a large measure to the *bhāoli* system, under which the cultivator frequently does not take the trouble to cultivate all the land he holds. The average area irrigated from the canals during the same period was 53,500 acres, but the greater portion of the district is irrigated from *āhars* and *pains*, and the total area irrigated from all sources varies from 60 per cent. in the Sherghāti and Bārāchatti police circles to 90 per cent. in the Dāūdnapar and Arwal thānas.

EXTENSION OF
CULTIVATION.

According to an estimate* made 30 years ago, the area under cultivation at that time was 1,728,006 acres, of which only 864,000 acres grew rice, while the uncultivated area was 1,419,000 acres. The normal cultivated area has now increased to over 2,000,000 acres, and that under rice to over 1,300,000 acres, while 158,000 acres are classed as culturable waste, and the area not available for cultivation is 655,800 acres, or about one-fifth of the total area of the district. This increase of cultivation is largely due to the great progress in the western portion of the district, where the canals have turned neglected waste into fertile fields. Speaking of Dāūdnapar in 1812, Buchanan Hamilton says:—"This division has been a good deal neglected, and the poorer lands are in general waste, and in the dry season look very dismal, being covered with stunted thorns without a pile of grass. Some of the best land even is neglected, and is chiefly occupied by poor-looking woods of the Palas (*Butea frondosa*)."¹ His description of the country round Arwal is equally depressing, as he says:—"A great portion is neglected, and where the soil is poor, is chiefly overgrown with thorns of the stunted *jujab*. Where the waste land is rich, it is overgrown with harsh long grass, which in the dry season loses all vegetation."² The appearance of this tract is now widely different, as it includes some of the best rice-growing land in the district, and the barren waste is now covered with fields of waving grain. Elsewhere there are large areas not yet brought under the plough, especially in the south. Much of the waste has, however, been reclaimed in recent years—a process which has been accelerated by the development of communications and the construction of new lines of railway;

* See Food-grain Supply and Famine Relief in Bihar and Bengal, by A. P. MacDonell, 1876.

but in spite of this, the area still uncultivated is very large, and many parts of the district are undoubtedly capable of greater agricultural development.

The Bihāri is a conservative cultivator, and has an apathetic indifference to agricultural improvements. Various experiments have been made from time to time in the Government and Wards estates with different varieties of manures, seeds and modern implements, but these experiments have had little influence on cultivation generally, and practically the only innovation which has found favour with the people is the Bihāi sugarcane mill mentioned above.

IMPROVEMENTS IN METHODS OF CULTIVATION.

The scientific rotation of crops is not adopted as a principle of agriculture, but as a matter of practice it is observed, especially in the case of the more exhausting crops, such as sugarcane, which is never grown on the same land year after year, but is always alternated with other crops and generally with rice. A great part of the land growing winter rice bears that crop year after year, but sometimes a second crop of *khesāri* is raised, or if the land continues moist until harvest time, it may be ploughed and sown with gram and peas or barley. The *bhadoi* crops of early rice, maize and millets are also followed by a mixture of various pulses and oil-seeds with wheat and barley, the mixture of pulses and cereals serving the purposes of rotation, as the pulses belong to the leguminous family and enrich the soil with nitrogen.

Rotation.

Manure is largely used for poppy, sugarcane, potatoes and other garden produce, but not for other crops. Cow-dung is the most important manure, but its value is much diminished by the negligent manner in which it is stored, and the feeding of cattle is generally so poor that it is not rich in manurial constituents. Besides this, a great deal is lost by its conversion into fuel-cakes, as firewood is scarce, except in a few favoured localities, and its high price makes its use prohibitive for the ryots. For the most part, therefore, cow-dung only finds its way to the fields in the form of ashes; and the only other manure in common use consists of household refuse.

Manure.

From the figures in the Statistical Appendix it will be seen that loans under the Land Improvement Loans Act are taken by the people with fair readiness, and that the amount advanced

Land Improvement and Agriculturists Loans Act.

under the Agriculturists' Loans Act is comparatively small. The latter are devoted to the purchase of seed and cattle, and the former to the improvement or extension of the means of irrigation, such as the maintenance and repair of artificial embankments, water-channels and reservoirs.

CATTLE.

The cattle raised in the district, though hardy and suited to the climate, are generally of a very mediocre stamp; little or no care is taken in selecting bulls for breeding, immature or poor specimens being used; and the Brāhmani, or dedicated, bulls are usually no better than their fellows, though the freedom with which they are allowed to graze keeps them in better condition. The cattle are especially small in the south, and in consequence of their poor physique, three bullocks, viz., a pair under a shaft and a leader attached in front of the shaft, are constantly used to draw a loaded cart. The stock has little chance of improvement, as besides the want of careful and systematic breeding, there is difficulty in obtaining pasturage. In the thinly-cultivated tracts to the south, there is much pasture land and sufficiency of grass for the herds, but elsewhere the ground retains little moisture during the hot weather, and the grass being parched up by the burning sun, fodder is scarce. Nearly all the land available has been given up to cultivation; and the cattle have to be content with the scanty herbage found in the arid fields or are stall-fed on chopped straw.

Buffaloes are employed for the plough, especially when deep mud is being prepared for the transplantation of paddy, and are also used for slow draught work, but their chief value is for the milk which they yield in large quantities. Sheep are extensively reared by the Gareri caste, especially near the hills, where there is fallow land for pasture, and the wool is largely used in the manufacture of carpets, rugs and blankets. Goats are bred almost in every village, and pigs of the usual omnivorous kind are kept by the low castes, such as Doms, Dosādhs, Bhuiyās and Musahars. The only horses are the usual indigenous ponies; they are generally undersized and incapable of heavy work, but they are very hardy and those used for *ekkāṣ* often have astonishing endurance and a great turn of speed.

The diseases most prevalent among cattle are rinderpest and foot-and-mouth disease; over 1,000 cases of rinderpest and 550

cases of foot-and-mouth disease were reported in 1903-04. Veterinary assistance is afforded by itinerant Veterinary Assistants, and also at a veterinary dispensary which the District Board maintain at Gayā ; 70 horses and 81 cattle were treated as in-patients at this dispensary in 1904-05 and 352 horses and 644 cattle as out-patients.

CHAPTER IX.

NATURAL CALAMITIES.

IN common with other Bihār districts, Gayā is liable to suffer from scarcity, when the rainfall is deficient or untimely, and from floods, when it is excessive. The effects of anything but a very serious failure of the monsoon are, however, counteracted by a wonderful system of irrigation, and, though there has been scarcity in some tracts, the present generation has not known the protracted agony of a widespread famine. The people are also practically immune from the disaster of great inundations. The rivers, being for the most part hill-torrents, rise rapidly in flood after heavy rainfall, but their beds are so wide and the drainage slope so rapid that, even when they burst down in flood, they rarely overflow their banks, and, as they fall almost as fast as they rise, inundations are of short duration and cause but little damage.

FLOODS.

Local floods are occasionally caused, by the rivers breaching their banks owing to abnormally heavy rain in the hills, and also when a river leaves its old course and appropriates the channel of a *pain* or artificial irrigation canal. More serious floods are fortunately rare. Writing in 1877, Sir William Hunter said that there had been only one considerable flood within the memory of that generation—and this had occurred 37 years previously—but the water remained stationary for one day only, and the flood subsided in 9 or 10 hours. In more recent times the district has been equally free from inundation, and the only floods which call for notice are those which took place in 1896, 1901 and 1905.

Flood of
1896.

The most disastrous flood which has occurred within the memory of the present inhabitants of Gayā is that which visited the eastern portion of the Nawāda subdivision on the 16th September 1896. For two days there had been exceptionally heavy rain, which filled up all the water-courses and reservoirs, and

at midday the river Sakri, which takes its rise in the hills to the south-east, came down in flood, sweeping cattle, houses and trees before it, and covering the country for miles round with a sheet of water some two to twelve feet deep. There was but little loss of life, as the inundation was of short duration and the people were forewarned of its approach; and only 34 persons were drowned in the Gobindpur outpost, and 15 in the Kauwākol outpost, where the Natah and Baghail streams rose in flood. The damage to property was, however, very great, over 2,000 houses being completely demolished or seriously damaged, and large numbers were left homeless. The village of Gobindpur suffered especially severely, as out of 540 houses only 40 were left standing, and the houseless people had to take shelter in three masonry houses which escaped and in the office of the police outpost. The latter had been removed from another site 20 years previously, in order that it might be beyond the reach of floods, but the site to which it had been transferred proved equally unsafe, as the office was the only portion of the buildings which remained uninjured. Many of the roads were breached, and long stretches, especially on the Nawāda-Pakribārāwan Road, were swept away. The damage done to cultivation was scarcely less serious. The mouths of several *pains* were silted up, many *āhars* and other reservoirs were damaged or destroyed, and large areas were filled with sand, the crops being destroyed and the land rendered unculturable. The damage caused in this way was especially great in Dariyāpur. In South Dariyāpur only 12 out of 125 houses were left standing; and in the northern portion of the village some 50 houses were demolished, and the seventy houses which were left standing were all more or less damaged. Of the total cultivated area of 1,600 *biḡhas*, about 700 *biḡhas* were filled up with sand, and in place of a *pain*, which used to be only 18 cubits broad, the Sakri threw off three wide branches extending over an area of one-sixth of a mile. In all nearly 100 villages were affected, and the total loss of property was very great.

The inundation of 1901 was due to a simultaneous rise of both the Son and the Ganges. On the 1st September the level of the Son at the Koelwār bridge was only 9 feet, but by the morning of the 3rd idem it had reached the height of 17.6 feet;

Flood of
1901.

and the river continuing to rise throughout the night and all through the next day, the gauge showed the unprecedented flood-level of 22 feet by 2 A.M. on the 5th September. At the same time owing to a high Himalayan flood, the Ganges was rising abnormally high, and on the morning of the 5th September the flood-level of that river also was higher than any previously recorded, the gauge at Digha reading 35.10 feet in the early morning and 35.60 at midday. The Son, being thus unable to discharge the volume of its waters into the Ganges, forced its way over its western bank and poured over the low-lying lands towards Arwal.

The flood rapidly subsided, and to this must be attributed the small amount of damage done. No loss of life occurred, and the number of cattle drowned was inconsiderable. House property, however, suffered seriously, and some 520 houses were wrecked in the Arwal thāna. The damage to the crops was inappreciable, and the only serious loss was that of the houses and of the grain stored in them, which deprived their owners of their means of livelihood. In the event, it was found only necessary to relieve some of the poorer classes whose houses and stocks of grain had been swept away, and for this purpose a grant of Rs. 1,000 was given by Government and Rs. 600 was raised by public subscription.

Flood of
1905.

The immediate cause of the flood of 1905 was the exceptionally heavy rainfall which took place on the 14th, 15th and 16th September. On these three days there was heavy rain all over the district, but it was especially heavy in the southern portion of the Aurangābād subdivision and at Jahānābād, the fall ranging from 11 inches at the latter place to 16½ inches at Nabīnagar. Owing to this excessive precipitation, the rivers Pūnpūn, Dardhā and Jamunā rose to a great height and soon began to overflow their banks and flood the country. The drainage slope being from south to north, the water was held up by the two main embankments running east and west, viz., the Mughal-arai-Gayā Railway line and the Arwal-Jahānābād Road. The water rose to a considerable height on the southern side of these embankments on the 16th September, and the waterway provided proving insufficient, they both gave way. The railway line was breached in several places near Jākhim; and though the bridges on the Arwal-Jahānābād Road fortunately stood, long lengths of the road

were swept away. The Grand Trunk Road was also breached in two places, and many minor roads suffered severely. At Jahānābād the Court compound was under water to the depth of about a foot, and this too at a distance of over 200 yards from the ordinary bed of the river. The flood was of short duration : indeed in one place it was seen to rise 3 feet and again go down 2 feet within 10 hours on the 16th. It had entirely subsided in the Aurangābād subdivision by the morning of the 17th, though it went down somewhat more slowly in the Jahānābād subdivision.

As in the flood of 1901, little serious damage was caused by the inundation. The people had time to escape to the high lands near their homes, and 7 persons only were killed by being buried under falling houses. Many *āhars* were breached, but the crops were on the whole benefited, owing to the fertilizing silt deposited by the receding water. But few cattle were drowned, and the only loss sustained by the people was the destruction of their houses, which were washed down in large numbers.

Owing to the protection afforded by the canals in the western portion of the district and the indigenous system of irrigation in other parts, the district as a whole is practically safe from famine. It suffered to some extent in 1866, but passed through the scarcity of 1874 without receiving more than the modicum of relief insisted upon by Government, and in the great famine of 1897 no relief was required. In 1866 there was undoubtedly great suffering in outlying parts to the south and south-west, but the more fertile portions of the district were not seriously affected in spite of the failure of the rains, and during the period of greatest distress the average daily number of persons receiving relief was only 1,167. The great famine of 1874 made but little impression on Gayā, the largest number of persons on relief works being 2,756 and the average number gratuitously relieved for 7½ months being only 977. Even in the famine of 1897, which was so terrible a calamity elsewhere, Gayā did not suffer. Test-relief works were opened but were not attended, and out of the 50,000 persons who received gratuitous relief only 1,000 were inhabitants of the district.

The district suffered severely during the famine of 1866, but no standard exists by which to gauge the actual pressure. The

FAMINES.

Famine of
1866.

Collector reported that the price of common cleaned rice rose to Rs. 6-10-8 a maund, but prices in this district are an uncertain index to the pressure of want. Market rates apply only to a small fraction of the population; and in a time of scarcity, when people are unwilling to sell, they indicate far greater hardship than really exists. The distress was most severe in the vicinity of Gayā town, and to the south-west and south of the district within the Aurangābād and headquarters subdivisions, the distressed tract extending over an area of 1,300 square miles. The rice crop, in the greater part of this area, may be said to have failed completely in 1864; and from that time prices rose considerably and general distress began to be felt. The *rabi* or spring crops of 1865 were also much below the average, as the area under those crops was much contracted, owing to want of sufficient moisture in the ground and the difficulty experienced in obtaining seed, while the outturn was still further diminished by heavy hailstorms in the spring of 1865. From these causes the distress became so acute that in May and June the poorer classes were reduced to living upon the seeds of the *mahuā*-tree, berries, grass and herbs. This extreme destitution abated on the setting in of the rains, prices fell, and as field labour was obtainable, special relief measures were not deemed necessary. The condition of the people, however, did not improve, and the general distress reached its climax in October 1865, when only 7 seers of rice could be purchased for the rupee. The Collector commenced a daily distribution of grain, subscriptions were raised to defray the cost of maintaining the starving people, and a daily average of about 1,000 persons were fed at Gayā town from the 12th October to the 17th December. In the latter month, when the rice harvest afforded means of employment, and the market again fell, relief was suspended. But there was a renewal of the distress in March 1866. Severe hailstorms and a heavy rainfall in February, with the premature arrival of the hot winds, caused much injury to the spring crops. The stocks in the hands of dealers became exhausted, and the local supplies were mainly dependent on importations from Patna, the land-owners, who are large holders of grain under the *bhāoli* system, withholding their stocks from the market, in the expectation of still greater scarcity. Still no special measures were adopted till June, when

Collector reported that the price of common cleaned rice rose to Rs. 6-10-8 a maund, but prices in this district are an uncertain index to the pressure of want. Market rates apply only to a small fraction of the population; and in a time of scarcity, when people are unwilling to sell, they indicate far greater hardship than really exists. The distress was most severe in the vicinity of Gayā town, and to the south-west and south of the district within the Aurangābād and headquarters subdivisions, the distressed tract extending over an area of 1,300 square miles. The rice crop, in the greater part of this area, may be said to have failed completely in 1864; and from that time prices rose considerably and general distress began to be felt. The *rabi* or spring crops of 1865 were also much below the average, as the area under those crops was much contracted, owing to want of sufficient moisture in the ground and the difficulty experienced in obtaining seed, while the outturn was still further diminished by heavy hailstorms in the spring of 1865. From these causes the distress became so acute that in May and June the poorer classes were reduced to living upon the seeds of the *mahuā*-tree, berries, grass and herbs. This extreme destitution abated on the setting in of the rains, prices fell, and as field labour was obtainable, special relief measures were not deemed necessary. The condition of the people, however, did not improve, and the general distress reached its climax in October 1865, when only 7 seers of rice could be purchased for the rupee. The Collector commenced a daily distribution of grain, subscriptions were raised to defray the cost of maintaining the starving people, and a daily average of about 1,000 persons were fed at Gayā town from the 12th October to the 17th December. In the latter month, when the rice harvest afforded means of employment, and the market again fell, relief was suspended. But there was a renewal of the distress in March 1866. Severe hailstorms and a heavy rainfall in February, with the premature arrival of the hot winds, caused much injury to the spring crops. The stocks in the hands of dealers became exhausted, and the local supplies were mainly dependent on importations from Patna, the land-owners, who are large holders of grain under the *bhāoli* system, withholding their stocks from the market, in the expectation of still greater scarcity. Still no special measures were adopted till June, when

relief centres were opened at Gayā town, and at Sherghāti, Nawāda and Aurangābād; subsequently in August and September, additional centres were established at Konch and Fatehpur.

The sufferings of the starving people were still further aggravated by cholera, which made its appearance in the town of Gayā, about the middle of July, and thence spread over the interior of the district: the severe character of the outbreak is sufficiently illustrated by the fact that out of 927 pauper recipients of relief admitted to the Gayā hospital between June and November 1866, 447 died within an average period of two days after admission. During the period of the greatest distress, the average daily number of persons receiving relief ranged from 1,167 in the beginning of July to 934 in the first week of September. The mortality reported by the police, who probably underrated the actual loss of life, established the fact of 3,387 persons having died, or more than double the number of those relieved. This lamentable disproportion can only be attributed to the fact that the relief depôts were practically inaccessible owing to their distance from the mass of the starving population.

The course of events in Gayā during 1873 strikingly demonstrated the principle that the seasonable distribution of the rainfall is of more importance, within certain limits, than its actual quantity. The fall was below the average only in the headquarters and Aurangābād subdivisions, and in each of these tracts the deficiency was not more than 4 inches. Judging of the harvests from the quantity of rain which fell in 1873, it is difficult to believe that there could have been an extensive failure of the crops in Gayā in that year. Only 3 inches of rain fell in the first six months of the year, and even June, which is ordinarily classed as a portion of the monsoon period, was almost rainless; but in July there was an excessive precipitation amounting to double that of average years and varying from 20 inches in the west to 27 inches in the east of the district. In August the fall was slightly under the normal, but still it was sufficient to maintain the inundations caused in the preceding month. The autumn crops were seriously injured, and many reservoirs, on which the winter rice depends in dry years, were burst. The September rains, which are perhaps the most important for these

Famine
1873-74.

crops, were however markedly deficient, the consequence being a failure of varying degrees of intensity in different portions of the district. It is difficult to gather from the official reports and narratives a distinct idea of the outturn of the autumn crops, but it was probably not less than half of an average crop. The reports on the winter rice crop which, in the end of 1873, were very gloomy, assumed, as the harvest progressed, a much more hopeful tone; and in February 1874, when it had been gathered on the threshing floors, the outturn all over the district was estimated to have been three-eighths of an average crop, the yield in parts of Aurangābād and Nawāda subdivisions being even characterized as particularly fine. Towards March the district was providentially favoured with an abundant fall of rain which, combined with the judicious utilization of the canal water in the west of the district, secured to it an average spring food-crop and a good outturn of opium. The price of rice did not rise above 10 seers to the rupee; from June to August 12 seers were obtainable, and it was much cheaper later on.

Private trade was active throughout the year, and one of the chief causes of the distress in 1866, viz., the impassable condition of the Patna and Gayā Road, no longer existed to hinder the transport of grain. Government grain, however, was stored throughout the district, relief works were instituted, and a comparatively small number of the poorest classes were charitably relieved. But these special measures were simply precautionary. In charitable relief 220 tons of rice were distributed, 2,43 tons sold for cash, 85 tons advanced on loan, and 117 tons paid in wages. In all Rs. 11,522 were distributed in charitable relief, Rs. 40,648 paid as wages, and Rs. 40,503 advanced on recoverable loans. The daily average number of persons charitably relieved in the whole district rose from 480 in the beginning of May to 2,120 in the beginning of August, and fell in the beginning of October to 542. There were 454 labourers employed on relief works in February; 1,334 in April; 2,756 in June, and 377 in August.

The irregularity of the monsoon of 1888, marked by a late commencement and early cessation, together with excessive rainfall in August, resulted in the partial destruction of the autumn rice crop, and in the diminution through drought of the yield of

the winter harvest. The total rainfall was plentiful, amounting to 55·78 inches, but it was very unevenly distributed, being enormously excessive in August, when over 7½ inches fell in one day, and far below the requirements of September and October. Eventually, the outturn of both the *bhadoi* and *rabi* crops was under 40 per cent., and that of the *aghani* crop only 50 per cent. of a normal crop. Scarcity ensued, but there was not much distress, except in a tract near Sherghāti. Some relief works were started, but the expenditure only amounted to Rs. 4,300, the largest average daily attendance being 4,500 in June.

The history of the famine of 1896-97 showed clearly how great is the protection secured to Gayā by the system of *pains* and *āhars* in a year of unequally distributed rainfall. The rains of 1896-97 began late, not commencing till late in June, when there was a heavy fall amounting to 8½ inches. There was another downpour of 10½ inches early in July, and then a long drought succeeded, which was followed by nearly 11 inches of rain in August. Another long break next ensued till the middle of September, when the rainfall was nearly 4 inches. After this there was no more rain, and by the end of October the deficiency was 7½ inches or 17·8 per cent. The season was thus characterized by heavy falls alternating with long periods of drought, which would have resulted in scarcity elsewhere, as the *bhadoi* would have withered, the seed-beds of rice dried up, and the rice-fields remained unplanted. In Gayā, however, the evil effects of these vagaries of the rainfall were counteracted by the system of irrigation by which the water is conserved in reservoirs and thence distributed over the fields, for, as each burst of rain occurred, the water was carefully stored and used as required. In the event, the outturn of *aghani*, which is the most important crop in the district, was 50 per cent. and that of *bhadoi* 75 per cent. of a normal crop, while the *rabi* crop was nearly up to the average. Prices here as elsewhere ruled very high, rising to 8·4 seers to the rupee at the end of October 1896, but considerable stocks were held by the cultivators. Exportation was stopped, and the reserve stores of grain which the people keep were everywhere held up, partly for consumption and partly for sale when prices rose still higher. Work was plentiful in the fields, and as this is always paid chiefly in grain, the labourer did not

Famine of
1896-97.

feel the high prices any more than the agriculturists who lived on their own stocks; while there was plenty of additional employment on the Mughalsaraj-Gayā and South Bihar Railway lines, which were then under construction. Grave apprehensions were entertained at one time for some tracts, viz., the northern part of the Jahānābād subdivision, the portion of the Sherghāti thāna south of the Grand Trunk Road, and a tract in the north-east of the Aurangābād subdivision between Aurangābād and Goh. In these tracts the people were not so well off as elsewhere, because the rainfall was more scanty; and the system of reservoirs being incomplete, there had been a more or less complete failure of the *aghani* crop. Eventually, however, even these tracts did not suffer, the *rabi* crop being far better than had been expected; and, as in 1873-74, the stocks of the people enabled them to maintain themselves until the *rabi* was reaped, and again till the *bhadvi* harvest came in. The district, in fact, passed scatheless through the famine, no relief being required except what was given in kitchens and poor-houses along the Grand Trunk Road to pilgrims and travellers, and, late in 1897, to beggars and paupers in the town of Gayā. The only expenditure incurred by Government was in the shape of advances to landlords and tenants, Rs. 1,06,000 being given out under the Land Improvement Loans Act, and Rs. 23,600 under the Agriculturists' Loans Act. The expenditure on gratuitous relief was met out of charitable funds, Rs. 9,900 being spent in the distribution of grain and money, while the maintenance of kitchens cost Rs. 7,700. In this way about 50,000 persons were relieved, but, as already stated, only 1,000 of these were natives of the district.

Since that time the district has been entirely free from famine or scarcity of any kind, though scarcity was apprehended in a limited area in the west and south of the Aurangābād subdivision in 1902. This tract is unfertile, the soil is poor, and there is practically no irrigation, so that the crops are scanty at the best of times. There had been bad harvests in the two preceding years, the last rice crop had been almost a complete failure owing to a failure of the rains, and the outlook for the *rabi* crop was very poor. The ordinary cold-weather rains however fortunately fell, and this crop turned out a fair one; the population is scanty and inured to bad harvests and hard living; and labour being available

in the neighbouring areas of greater prosperity, as well as on works specially opened by the District Board in the tract affected; the people were enabled to hold out, and there was but little real distress.

When the district has been affected so slightly by one of the greater famines on record and has suffered so little from similar visitations in previous years, an immunity from general famine can reasonably be claimed for it. The reasons for this immunity are not far to seek. The district is cultivated almost entirely by artificial cultivation, canal irrigation renders one-fifth of the area independent of the vicissitudes of the seasons, and, though the rainfall is light, the system which obtains elsewhere is devised so as to utilize all the water available, whether that brought down by the hill-streams or the surface drainage of the country. The cultivators themselves are protected from the distress consequent on scarcity and the rising price of food by the reserve stocks of grain which they keep, in accordance with immemorial custom, both for their own consumption and to afford seed for the ensuing harvest. The effect of high prices is moreover discounted in the case of landless labourers by the fact that they are paid in kind, while the lowest and most destitute of them, the *kamiyās*, are entitled to be fed by their masters in virtue of their position as bond-servants. The district is covered with a network of roads, and the railway has now penetrated in all directions, with the result that even the more remote parts are within easy reach of the markets. The development of communications has had the effect of levelling prices over larger and larger areas, and at the same time there has been a great advance in the material prosperity of the people. On the other hand, isolated tracts, where the soil is unfertile and where there is practically no system of irrigation, are always exposed to the danger of scarcity; and according to the official returns for 1905-06, it is estimated that 2,031 square miles, with a population of 772,000, is liable to famine, and that 49,000 persons are likely to require relief in the event of serious famine.

CHAPTER X.

IRRIGATION.

SYSTEMS OF
IRRIGATION.

THE agricultural prosperity of Gayā depends in an unique degree on an extensive system of artificial irrigation. To the north-east the cultivators have the benefit of the Son Canals and are thus certain of an ample and regular supply of water, but elsewhere the people are dependent on methods of irrigation which have been practised from time immemorial. This indigenous system is the outcome of the natural conditions and physical configuration of the country, and has been evolved to meet the obstacles which they place in the way of cultivation. The district is characterized by a scanty rainfall, a rapid slope off which the water quickly runs, and a soil which is either a stiff clay or a loose sand equally unretentive of moisture. To a ryot of Eastern Bengal the country would seem utterly unsuited for rice cultivation, both from the nature of the surface and the comparative scantiness of the rainfall. But both difficulties have been overcome by the ingenuity and industry of its inhabitants, who have devised a system by which the natural drainage is blocked and the water impounded for use, and have also brought the rivers into their service by diverting the water they bring down.

The district is bounded on the south by the high lands of the Chotā Nāgpur plateau and the spurs which project from it, and along the northern boundary it marches with the low-lying plains of the Patna district. The general slope is accordingly from south to north towards the Gangetic valley, and it is comparatively rapid, the average fall northwards being about six to four feet in the mile. A number of wide rivers debouch from these southern hills and intersect the district as they flow across it from south to north. They are swollen torrents after heavy rainfall in the hills, but the slope of the country is so great and their beds are so sandy,

that the water is rapidly carried through the district or it percolates down through the sand. In order therefore to prevent the water being wasted in this way, long narrow artificial canals, called *pains*, are led off from the rivers, by means of which the river water is conveyed to the fields. The same rapid slope would also prevent the land from gaining the full benefit of the rain water, were it allowed to flow unchecked; and the cultivation of the rice crop, on which the people almost entirely depend, would be impossible, if the water were not impounded in extensive reservoirs, called *āhars*, which are formed by constructing a series of retaining embankments across the line of drainage. The whole forms a most remarkable and ingenious system of artificial irrigation, which is admirably supplemented by the manner in which the water is distributed from field to field and retained in them by a network of low banks. In the cold weather, again, when the *āhars* have dried up and the *pains* no longer contain water, the people can fall back on their wells; and thus the crops are protected from failure throughout the year.

The rainfall being often scanty and untimely, the system of *pains* has been devised in order to make the most of the scanty supply, by utilizing the rivers for the purposes of cultivation. The rivers of Gayā have only a fitful flow; they may fill for a few days and be almost empty for the next fortnight, and then fill again with a day or two's rainfall; but by means of these artificial channels the cultivators secure all the water they bring down. Roughly one-third of the total irrigation of the district may be said to be derived from *pains*.

They are led off from a point facing the current of the river, some way upstream above the level of the land they are intended to irrigate; and it is often 2 or 3 miles before the water of the *pain* reaches the level of the cultivation. Some are large with many distributaries and some small with few or no distributaries. They are sometimes as much as 10, 12 or even 20 miles in length, and some of them irrigate hundreds of villages. The largest *pains* that feed a number of distributaries and irrigate many thousand acres are known as *dasaiā pains*, i. e., literally *pains* with 10 branches. The main channels are known as *pains*, and the smaller channels taking off from them are called *bhoklā*, while the smallest channels that lead immediately into the fields

INDIGENOUS
SYSTEM.

Pains.

are known as *karhās*. Where the level of the country permits, the water is led into the fields from these *pains* and *bhoklās* by means of the *karhās*, but where the level of the water in the *pain* or *bhoklā* is below that of the fields on either side, the water is raised by some of the artificial means in use in this part of the country, such as the *lāth kunri* or lever and bucket, the water-basket called *chānr* or *sair*, and the *karīn* or wooden canoe-shaped lift.

During the rainy season from July to September, the *pains* are full and flow well, but as the rains cease and the rivers dry up, the water has to be led into the *pain* by means of training works, known as *derhiain* or *baluain*. In a year of scanty rainfall or when the rain has been untimely, these *pains* are of the greatest importance for the rice crop and the sowing of the *rabi*. Should there be no rain at the time of the *Hathiyā nakshatra*—that most critical period of the year when water is absolutely essential to fill out the ripening grain, a sudden activity is at once seen in the rivers. Training works are vigorously pushed on at the heads of the *pains* to try and lead into them every drop of water left in the beds of the rivers; and the more wealthy landlords cause *bāndhs* to be erected at customary places to block up what water there is and thus give it a head into some *pain*.

These channels have been constructed by the landlords, who are also responsible for their maintenance—a work which entails considerable expense, as the *pains* quickly silt up, owing to the sandy nature of the river-beds, and have to be cleared out every year or two. Ordinary petty maintenance, however, such as the periodical clearance of silt, the repair of small breaches, etc., is done by the cultivators themselves under the *goām* system. At the order of the landlord or his local agent or servant, the cultivators have to supply one man per plough to turn out on these occasions and carry out the work; the peasants come in a body, and this is called a *goām*.

The *pains* are essentially private canals, and in the case of the more important which serve many villages, each village has its fixed turn of so many days and hours to use the water, these turns being assigned by mutual agreement or ancient custom. This distribution of the right of irrigation by turns (*pārā*) is known as *pārābandā*. In the case of the principal *pains* there is a celebrated

register of the distribution—the *Lāl Bahi*—prepared by the former owners of the Tekāri Rāj; and the entries in this book are still accepted as evidence of the rights of the villages specified in it. Disputes, however, frequently occur. One village often tries to get more water than it should, or else when the rainfall is scarce, villages lower down seek to get water before their proper turn; and the disputes sometimes terminate in blows, and occasionally in bloodshed. Quarrels are also common in regard to *bāndhs* or *garāndis*, erected across the *pains* or *bhoklās* to steal or divert the water, thus depriving lands further down of all supply; but considering the number of these channels and the vital importance of water in years of unfavourable rainfall, and considering the fact that they are all under the private control of the zamindārs and tenants, it is surprising how few cases end seriously.

Side by side with the *pain* system is that of *āhars*, the latter being constructed essentially for the irrigation of the high lands between the rivers which the *pains* cannot serve, though some are also constructed on the lower levels where *pains* are practicable. An *āhar* is an artificial catchment basin formed by blocking the drainage of the surface water, or even by blocking a small drainage rivulet, and thus locking up the water. These catchment basins are nearly always of a more or less rectangular shape, embankments being raised on three sides of the rectangle, while the fourth side is left open for the drainage water to enter. Owing to the slope of the land, the highest embankment is usually on the north, and this embankment generally runs east and west. From either side of it other embankments project southwards, diminishing in height as they proceed, according as the level of the ground rises. In this way a three-sided catchment basin is formed, deepest at the northern side, where there is always some arrangement to let out the water for the purposes of irrigation at the spot where the drainage of the catchment would naturally issue if there were no embankments.

If the *āhar* is built on a drainage rivulet, and thus receives the drainage of a larger area than its own, there is a spill or weir to pass off surplus water, which may perhaps flow to another *āhar* further north. In small *āhars* where the quantity of water banked up is not great, it is generally sufficient to cut a narrow passage through the earthen bank at the deepest spot to draw off the water

as required. If the mass of water is greater, a half pipe, formed out of the trunk of a palm-tree and known as a *dongā*, is let into the bank to protect it from excessive erosion; and if the *āhar* is a very big one, a masonry outlet is often built into the bottom of the bank, which goes by the name of *bhāo* or *bhāoāri*. The different parts of an *āhar* also have distinctive names. The bed inside the embankments is the *pet* or belly, the banks are called *pind*, the side banks being known as *ālang*, and the main bank at the lowest side of the *āhar* as the *pīth* or back—a name which is also frequently given to the portion behind the main embankment.

When the water is wanted to irrigate, not the lands to the north, which are on a lower level, but the lands to the east or west on the same or a higher level, it is lifted by one of the methods for raising water mentioned above. One or other of these lifts is erected on the edge of the *āhar*, and the water is raised into a channel on a higher level, through which it flows to the field where it is required. If the water in the *āhar*, is low and does not reach the bank, a depression (*kandari*) is dug by the side of the bank, and a small channel is cut from the deep part of the *āhar* leading into this depression. Sometimes when the level of the water is very low, it is necessary to employ a series of two or even three lifts to raise it to the level required.

The prime value of these catchment reservoirs is that they store up the water that would otherwise be carried away by the naturally rapid drainage of the country. They are in fact indispensable on the higher tracts that lie between the river-basins, firstly for irrigating the paddy as it grows up, and secondly for the sowing and germination of all the *rabi* crops. On these high lands *pain*s are not practicable; and if it were not for the *āhars*, there would be no water available for the purposes of irrigation after the month of September. Almost half the irrigation in the district is effected by the *āhar* system, which is quite distinct from that of *gearābandi* mentioned below and also from that of *pain* irrigation. A *pain* may eventually lead into an *āhar* after it has almost spent itself, but, as already stated, *pain* irrigation is not possible on the highest lands, for which the *āhars* have been specially devised. They are in fact usually constructed on high lands in the parallel strips lying between the rivers, where the

clay is comparatively hard and little silt accumulates, whereas the *pains* take off from the sand-laden rivers and irrigate the lands situated in the river-basins. These *āhars* are often of great size, the largest irrigating about 1,000 acres. They are usually kept in good repair, by digging a layer of soil from the bed of the *āhar* and heaping the soil on the banks. As in the case of *pains*, small repairs are done by the tenants, and large repairs requiring considerable expenditure are carried out by the landlords.

Genrābandi.

The system of *āhars* and *pains*, which prevents the water escaping and makes it available for cultivation, is further supplemented by that known as *genrābandi*. It has already been remarked that the country slopes gradually to the north and that the rivers and hill-streams, issuing from the hills and flowing northwards, intersect it and cut it up into a number of parallel strips. Each of these watersheds again has a strong slope east and west from the centre down to the river-beds, and much of the land is too high for artificial irrigation and depends for its moisture on the rainfall. A series of low retaining banks are therefore built across the line of drainage, which are connected by other banks running north and south. The main outer embankment (*gherawā*), which is about 4 feet high, encloses a considerable area; this is split up by minor embankments called *genrā*; and within these again are low banks (*āl*) round the fields. This series of banks, which has aptly been described as resembling an enormous chess-board, is admirably adapted for retaining the surface water, as not a drop is allowed to flow beyond their limits and the stiff soil is given time to absorb the moisture. This system is known as *genrābandi*, and is followed not only on the high lands, but also in the irrigated area, in order to ensure the fullest possible use being made of all the water available.

Wells.

As water does not remain in the rivers for more than a few months, and the *pains* usually dry up before the end of the year, irrigation must be carried on from *āhars* or wells when this source of supply fails. In a very dry season the *āhars* also dry up by the end of the year, and from January to June recourse must be had to wells, except when rain falls. Well irrigation is almost entirely confined to the immediate vicinity of the villages, where poppy, market and garden produce, *maruā*, barley and similar crops are grown, and where the produce is much better and more

valuable than in the lands further from the village, which are irrigated from *puins* and *āhars*. Perhaps 90 per cent. of the wells in the district are in lands immediately adjoining the village, and they are hardly ever used for the *kharīf* or the larger portion of the *rabi* crops. Temporary wells are also commonly used in tracts where the soil is sandy or along water-courses. Such wells afford considerable protection against drought to the poppy which is so largely grown in the district, and also to other dry crops. It has been estimated that 12 or 13 per cent. of the total irrigation is effected from wells.

Water-lifts.

The methods of drawing and distributing water are those common to the whole of Bihār, and here, as elsewhere, the most usual contrivance for lifting it is the *lāth* or lever. This consists of a long beam working on an upright forked post, which serves as a fulcrum; at one end the beam is weighted with a log, stone or mass of dried mud, and at the other is a rope with a bucket attached, which when not in use rests above the well. When water is required, the cultivator pulls down the rope till the bucket is immersed; as soon as the tension is relaxed, the weight attached to the lever raises the bucket of itself; and the water is then emptied and led by narrow channels into the fields. Irrigation by means of the *mot* (leather bucket) is much rarer. When this method is employed, water is raised by a large leather bucket secured to a rope, which passes over a rude wooden pulley supported by a forked post, and is fastened to the yoke of a pair of bullocks. These supply the motive power, for as soon as the bucket has been filled, they descend an inclined plane, varying in length with the depth of the well, and thus bring it to the surface. One man is required to look after the bullocks and another is stationed on the well to let down the *mot* and empty it when it comes to the surface.

Two other water-lifts commonly used are the *karīn* and *sair*. The *karīn* is a long wooden scoop, made out of a single piece of wood, hollowed out and shaped like one-half of a canoe. The broad open end of this scoop rests on the water-channel leading to the field, and the pointed closed end is dipped into the water, which is then raised by means of a lever overhead with a weight at the end of it. This machine is used for lifting water either from the reservoirs (*āhars*) which are so numerous in the district

or from a lower to a higher channel where water is plentiful and the elevation small. The *sair* or *chānr* is used when the quantity of water remaining is small; it is a triangular basket made of bamboo with the edges raised on two sides; cords are attached to each side, and these are held by two men, one standing on either side of the ditch from which the water has to be raised. Holding the ropes attached to either side, they swing it backwards, and bringing it down sharply into the water, carry the forward motion of the swing through until the basket, now full of water, is raised to the level of the water-channel, when the contents are poured out.

The north-western portion of the district is not dependent on the methods of irrigation mentioned above, as it is served by a portion of the Son canal system. This system derives its supply from an anicut across the Son at Bārūn, which was begun in 1869 and completed in 1875 at a total cost of 15 lakhs of rupees. The anicut or weir, which is 12,469 feet long, consists of a mass of rubble stone laid to a uniform slope and stiffened by walls of masonry founded on shallow wells. Scouring sluices are provided at either flank; and these are fitted with gates which can be opened or closed at any state of the river other than high flood. By means of these gates the level of the water in the pool above the weir can be kept at the height required to feed the canals. Here the Main Eastern canal branches off and runs as far as the Pūnpūn river, 8 miles to the east. It was originally intended to carry this canal as far as the Monghyr district, but after being cut as far as the Pūnpūn, the project was abandoned. The Patna canal leaves the Main Eastern canal 4 miles from the Son, and, running north through the *pargana* of Arwal almost parallel to the western boundary of Gayā, eventually joins the Ganges at Digha between Bankipore and Dinapore. Its total length is 79 miles, of which 43 miles lie within this district, where it irrigates parts of the *parganas* of Siris, Dādar, and Goh, and the greater part of Arwal. The total area commanded by these two canals and their distributaries is 170,000 acres, being bounded on the north by the Patna district, on the south by the Grand Trunk Road, on the east by the river Pūnpūn, and on the west by the Son. It is estimated that 166,000 acres are annually irrigable, but the area actually irrigated has never been anything like

CANALS.

this figure. In 1904-05 it was 56,400 acres, of which 48,700 acres were under rice. Though the area actually under irrigation is even now only one-third of that irrigable, it has been expanding speedily, and it is now 50 per cent. greater than in 1893-94.

Canal
administration.

The whole system is under the control of a Superintending Engineer, who is assisted by an Executive Engineer and an Assistant Engineer. The latter are responsible for the maintenance of the canals and the conduct of irrigation operations, and a separate establishment is entertained for the collection of the revenue. The irrigated area is divided into blocks, the lease of all the lands in each block being arranged so as to lapse in the same year; and in fixing the period of the leases efforts are made to see that leases for an equal area expire each year. Water is supplied to the cultivators on application on a prescribed form, the year being divided into three seasons, that is, hot weather, *kharif* and *rabi*. A date is fixed for each season, and the lease or permit granted for that season is only in force for that particular period.

Besides the season leases, there are long-term leases, or leases for a period of seven years, which are granted at a somewhat reduced rate. These long-term leases are only granted for compact blocks defined by well-marked boundaries of such a nature that the leased lands can be clearly distinguished from the adjoining unleased lands, and also so situated that unleased lands will not be ordinarily irrigated by water supplied for the land included in the block. These boundaries are mentioned in the application for the lease, on receipt of which a special report is submitted to the Subdivisional Canal Officer. If the lease is likely to be approved, he issues orders for the block to be measured, and a detailed *khasra*, or measurement of each cultivator's holding is then made. The lease is finally approved by the Divisional Canal Officer who issues the permit, but before this can be done, every cultivator, who has fields within the block, must sign his name against the area which has been measured, and which will be assessed in his name. In order to admit of a lease getting water for the season, a provisional permit is granted for the season on the area originally applied for; this permit is cancelled when the long-lease permit is finally granted. Fields which cannot be ordinarily irrigated, or for which canal

water is not ordinarily required can be excluded from the block, such fields being duly noted in the *khasrā* or measurement paper.

In these long-term leases water-rates are charged for the area measured and accepted by the cultivators, whether water is required or not; and the channel by which the area is irrigated must be registered as well as the name of its owner. In *rabi* and hot-weather leases water is supplied on application, and water-rates are levied on the actual areas irrigated, and not necessarily on those specified in the application. In order to assist the Canal Department as far as possible in regulating and distributing the water to the different cultivators named in the leases *lambardārs* or headmen are appointed; these are influential men of the village, who are appointed on the approval of the majority of the cultivators concerned. Their duty is to assist in measurements, to give in the names of the cultivators of the different holdings, and to see that water is properly distributed over the leased area. For these duties they are paid a commission of 3 per cent. on the total assessment on long leases and of 2 per cent. on season leases.

There are five rates charged for the water supplied, viz., (1) *rabi* season leases from the 15th October to the 25th March at Rs. 2-8 an acre; (2) hot-weather leases from the 25th March to the 25th June at Rs. 4-8 an acre; (3) leases during the same period at Rs. 2 for each watering; (4) *kharif* season leases between the 25th June and the 25th October at Rs. 4 an acre and (5) seven years' leases for block areas for any kind of crop between the 25th June and the 25th March in the next year at Rs. 3 an acre.

Water-rates.

In the case of *bhāoli* lands, where the produce is divided between landlord and tenant, the duty of paying the water-rate falls primarily on the tenant, but usually he prevails on the landlord to pay half or such proportion as the latter receives of the produce. In the case of *nagdi* lands for which rent is paid in cash, it has become a recognized custom that the landlord should pay half the water-rate, and in practice this is done by deducting half the rate from the demand leviable from the ryot.

When the long-lease system was inaugurated, it was calculated that water would be given for 50 per cent. of the whole area of a village; and this portion was marked off into one or more

well-defined blocks, for the irrigation of which a charge was made at a reduced rate. The cultivator is supplied with water enough for his own block, but he may not use it beyond these limits; and it is, therefore, laid down that there must be a well-defined village channel to conduct the water from the distributary, and that it is not to be allowed to escape to an *āhar*. The landlords generally bear the expense of constructing these channels, but occasionally it is met by the tenants when the land is held under occupancy right. Of all the leases the most popular are the long leases, which are given only for the areas for which protection can be assured even in the driest years. The rates for this class of lease were originally fixed at a low figure, owing to the backwardness of the cultivators in resorting to canal irrigation and to the fact that the use of canal water is not indispensable in years of ordinary rainfall; the holders of these leases have preferential claims to water during periods of high demand such as occur in dry seasons; and, as the cultivators have been quick to recognize the advantages of the system, the area under long leases has steadily expanded, until at the present day by far the greater part of the whole irrigated area receives water on long lease, and the demand for such leases cannot be fully met.

WORKING OF
THE INDIGEN-
OUS SYSTEM.

Canal irrigation has turned a most infertile tract, a large part of which was sandy and unproductive, into a region of rich fertility. It serves, however, but a comparatively small portion of the district, and the remainder is dependent on the indigenous methods of irrigation mentioned above. There can be no doubt that the latter system is absolutely indispensable, and that without it a large portion of Gaya would be converted into barren waste. The construction and maintenance of these irrigation works is consequently a matter of supreme importance, but unfortunately there is a tendency to let them fall into disrepair. Owing to the general prevalence of produce-rents and the physical and climatic conditions that necessitate the upkeep of artificial works of irrigation, the duty of inaugurating and maintaining them lies to a peculiar extent upon the landlords. The ryots could not or would not combine of their own accord to keep them up. Individually, they have not the capital necessary to undertake expensive works of such magnitude, and collectively they have not yet acquired sufficient self-reliance to unite among

themselves for the purpose of constructing them. The result is that it is the customary obligation of the landlords to construct and maintain these works of public utility; but the latter are not always alive to the necessity and advantage of doing so. This is particularly the case with *pains*, which are apt to be neglected, while there is a more serious danger in the fact that no new *pains* of any considerable size are being constructed. The largest of these irrigation channels, and those that serve the greatest number of villages, were made many years ago, when larger areas were under the control of single zamindars, and the local authority of these zamindars to enforce their orders and wishes was more absolute than it has been, or can be, under the restrictions imposed by the legislation of more recent times. As a general rule, no large *pain* is now excavated, and many of the largest of former times have fallen into disrepair and even disuse. This result is due to the gradual disintegration of property, that *parcellement* of proprietary rights which has been encouraged by modern legislation. Where formerly there was a single zamindar in mere or less absolute authority, there are now perhaps fifty petty landholders, whose interests conflict or whose relations are so strained that they can never combine to carry out a work of mutual benefit. As an instance of this, it will be sufficient to cite the case of a *pain* now in almost complete disuse, which is reported to have served a hundred villages in its day. This *pain* passed through a tract of country, where, owing to three successive years of scanty rainfall, scarcity was apprehended, and the Collector endeavoured to persuade all the landholders through whose properties the channel passed to combine and repair it, as a certain remedy against scarcity in the future. These efforts were unsuccessful; many of the zamindars were quarrelling and engaged in litigation *inter se*; and nothing would induce them to carry out the work.

Not only are *pains* liable to be neglected owing to the subdivision of proprietary rights, but their number is apt to diminish owing to the want of a proper headwork to control the inflow, as well as to regulate the water-level of the channel at its entrance. Much damage is caused by *pain* scouring out at the head, and sometimes such widening and deepening results in the channel of the *pain* becoming ultimately the course of the river.

In this way, the original bed of the river becomes silted up ; the tract of country formerly irrigated from it by other *pains* taking off lower down are left without means of irrigation, and cultivated lands are converted into waste ; while the main stream, having adopted the artificial channel of the *pain*, cuts away the adjoining land, and floods and depreciates other lands by a deposit of sand.

CHAPTER XI.

SYSTEMS OF RENT PAYMENT.

THE system of rent payment prevalent in Gayā is that known as *Bhāoli*; i.e., the payment of rents in kind. Some 70 to 75 per cent. of the cultivation is held under this system, which is a necessary result of the physical configuration of the country and is intimately connected with the system of irrigation in vogue. It has already been explained that Gayā owes not only its fertility, but almost its very existence as an agricultural country to artificial irrigation, and that extensive irrigation works are necessary to render rice cultivation possible. Their construction requires a large expenditure which the ryots themselves would be unable to afford and an amount of combination which they have not yet attained. The whole of the tenants in one village may depend upon the water obtained from one *āhar* or *pain*; one reservoir or channel again may serve several villages some distance apart; and it is quite beyond the means of the cultivators to construct and keep up such extensive works or maintain their rights in them against the encroachment of others. The landlord is the only person who can supply the capital for their construction or fight for the villagers' rights; and for this again ample means are necessary, as the bulk of the litigation of the district arises out of irrigation disputes. Without *pains* and *āhars*, the tenant in many parts would get no rice crops; and on the other hand, if he paid a fixed cash rent to his landlord, the latter would be in a position to spend the money in other ways and to neglect the duty of laying out channels and embankments and of keeping them in order. Custom has therefore decreed that these works shall be made and maintained by the landlord, each tenant paying his quota of the expense by giving a certain proportion of the harvest as rent; and the result of this

THE
Bhāoli
SYSTEM.

arrangement is that the amount of the landlord's rent depends entirely on the extent to which he provides facilities for irrigating the land. Splendid rice crops are obtained wherever the embankments and water channels are kept in proper working order; and, on the other hand, where they are neglected, the yield falls off enormously in a year of capricious rainfall. The actual produce of the land, therefore, varies in proportion with the extent to which the zamindār incurs expenditure on irrigation; and this consideration has induced the cultivators, so far as the memory of man or tradition runs, to secure the active partnership of their landlords by giving them a share of the actual crops in lieu of a regular money rent. Rents are accordingly paid in kind for lands benefited by irrigation works constructed at the zamindār's expense; the profits of the latter are directly affected by the outturn; and an assurance is thus afforded that he will not neglect to spend money on their upkeep. In this way, if the landlord does not bear what are called *gilandāzi* charges, *i.e.*, does not maintain the reservoirs properly, the crop is a failure, and he gets little or nothing; while if he spends an adequate amount on such works, a good harvest is reaped and he gets a fair outturn for his outlay.

This *gilandāzi* is an excellent form of investment, as the capital spent on it returns a dividend of 40 to 50 per cent. in the first year; in some cases, it is said, it has been found to yield a profit of 100 per cent. If landlords even received only half the produce of the land irrigated by these works, they would get a very good return on their capital outlay. The ideal rule of the *bhāoli* system is that the produce should be divided half and half between the landlords and tenants, but, as a matter of fact, such a division is very rare, and the landlords constantly take $\frac{2}{3}$ ths and often $\frac{3}{4}$ ths of the produce. In exceptional cases, it is true, they may take less than a half share of the produce, *e.g.*, when waste land has been brought under cultivation, or, in special cases, when the cultivation requires unusual labour on the part of the tenant; but these cases are not frequent, and the ordinary practice is for the landlord to take a little more than half.

The share of the produce which the landlord receives is determined either by *batāi*, *i.e.*, the actual division of the crops on the

threshing floor, or by *dānābandi*, i.e., appraisement of the crop before it is reaped. Under the *batāi* system, or the *agorbatāi* system, as it is called, because the landlord's men have to watch (*agornā*) the crop carefully to prevent their masters being robbed, the grain is harvested by the cultivator and carried by him to the threshing floor, where it is divided between the landlord and tenant, after the payment of the allowances given to the harvesters and others.

Under the *dānābandi* system the division of the produce has passed into an estimate of its quantity or value before the crop is cut. The produce of each field is appraised before the harvest, and the ryot is allowed to take the whole away, being debited with the landlord's share or its value. When the crops are nearly ripe, the landlord, or his agent, and the cultivator repair to the field, accompanied by the *patwāri* or village accountant, an *amin* or assessor, a *jarībkash* or measurer, a *sālis* or arbitrator, a *navisinda* or writer, and the village headman. The measurer having measured the field with the local pole, the arbitrator goes round it, and after a consultation with the assessor and the village officials, estimates the quantity of grain in the crop. If the tenant accepts the estimate, the quantity is entered in the *patwāri's* field-book (*khasrā*) and the matter is considered settled. If the tenant objects, or if the assessor and the arbitrator cannot agree, the fellow-tenants are called in as mediators; and if they fail to convince either party, a test crop-cutting *partāl* takes place, the landlord selecting a portion of the best part of the field, and the tenant an equal part of the worst part. The produce of both is reaped and threshed, and the grain having been weighed, the whole produce of the field is calculated from the amount weighed, and is entered in the field-book. The tenant is then at liberty to reap the crop and harvest it whenever it suits his convenience. The total share of the landlord, which is entered in a statement called *behrī*, is appraised according to the market value of the grain, and is paid by the tenant either in grain or money according to the agreement made between them.

*Dānā-
bandi.*

There is no regular custom as to the method of realizing produce rents. It is not the case that one village has a permanent custom of always paying rent by the *batāi* system, and that